

CLAIMS

1. A non-thermal plasma reactor element comprising:
a multi-cell stack comprising a plurality of formed building blocks of dielectric material, walls of said building blocks defining a cell having an exhaust passage for flowing gas therethrough, wherein a conductive print forming an electrode and connector is disposed on at least one wall of said cell; and
outer insulative plates disposed on opposite ends of said multi-cell stack.
2. The non-thermal plasma reactor element of claim 1, wherein said building block comprises a full cell.
3. The non-thermal plasma reactor element of claim 1, wherein said building block comprises two half cells.
4. The non-thermal plasma reactor element of claim 1, wherein said conductive print comprises a continuous grid pattern forming an electrode and terminal connector and having a cut-out region disposed opposite said terminal connector for reducing potential voltage leaks.
5. The non-thermal plasma reactor element of claim 1, wherein said conductive print is extended over an edge of the said cell to provide a site for electrical connection along the side of each cell in said multi-cell stack.

6. The non-thermal plasma reactor element of claim 1, wherein said conductive print is disposed on top and bottom walls of outermost cell in said multi-cell stack and remainder of said cells have conductive print disposed on only one wall.

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7. The non-thermal plasma reactor element of claim 1, wherein said cells comprising said multi-cell stack are connected with glass glue diffused at selected print locations into dielectric material comprising said cells.

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8. The non-thermal plasma reactor element of claim 1, wherein said cells comprising said multi-cell stack are connected with collars.

9. The non-thermal plasma reactor element of claim 1, wherein said cells comprising said multi-cell stack are connected with adhesive disposed along sides of said multi-cell stack.

10. The non-thermal plasma reactor element of claim 1, wherein said conductive print comprises three-dimensional conductive print.

11. The non-thermal plasma reactor element of claim 1, wherein said dielectric material is selected from the group consisting of cordierite, titania, alumina, steatite, mullite, plastics, or a combination thereof.

12. The non-thermal plasma reactor element of claim 1, wherein said walls defining said cells comprise side walls and top walls,

wherein said side walls comprise a thickness of about 10 to about 20
 millimeters and said top walls comprises a thickness of about 0.3 to about 0.8
 5 millimeters.

13. The non-thermal plasma reactor element of claim 1,
 wherein said building block further comprises a structural ligament formed as
 part of said dielectric building block.

14. The non-thermal plasma reactor element of claim 1,
 wherein said formed building blocks are formed via extrusion.

15. A method for preparing a non-thermal plasma reactor
 comprising:
 forming cell building blocks of material having a high dielectric
 constant;
 5 printing a conductive print onto said cells, walls of said cells
 forming an exhaust passage for flowing gas to be treated therethrough;
 assembling said cells into a multi-cell stack;
 preparing electrical connections for connecting said cells to a
 high voltage source;
 10 applying insulation to said multi-cell stack; and
 inserting said multi-cell stack into a non-thermal plasma reactor
 housing.

16. The method of claim 15, wherein said forming is by
 extruding.

17. The method of claim 15, wherein said building blocks
 comprise full cells.

18. The method of claim 15, wherein said building blocks comprise half cells, assembled in pairs wherein each pair forms a full cell.

19. The method of claim 18, wherein said forming comprises roll compaction fabrication.

20. The method of claim 18, further comprising:
disposing a catalytic coating on at least one of said half-cells.

21. The method of claim 15, wherein said printing comprises a printing sequence defined from a top portion of said multi-cell stack to a bottom portion of said multi-cell stack.

22. The method of claim 15, further comprising:
connecting said cells comprising said multi-cell stack by
diffusing glass glue at selected print locations into dielectric material
comprising said cells.

23. The method of claim 15, further comprising:
connecting said cells comprising said multi-cell stack with
collars.

24. The method of claim 15, further comprising:
connecting said cells comprising said multi-cell stack with
adhesive applied to sides of said multi-cell stack.

25. A non-thermal plasma reactor comprising a reactor
element as in claim 1, including:

- a high temperature housing surrounding said reactor element;
an insulated conductor connected with said cells for connecting
- 5 first electrodes to an alternating voltage source;
- a grounded conductor connected with second electrodes of said
cells for connecting said second electrodes to ground; and
means for directing exhaust gas through said cells.